

Expanded Description of a Chinese Endemic Snake *Opisthotropis cheni* (Serpentes: Colubridae: Natricinae)

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Abstract Based on seven newly-collected specimens, we provide an expanded description for the rare Chinese snake *Opisthotropis cheni*. The new specimens are consistent with the type series in scale counts and body dimensions. However, two individuals lack yellow cross-bands that are apparent in the type specimens. A key to the ten Chinese species of *Opisthotropis* is provided.

Keywords snake, *Opisthotropis cheni*, morphology, China

1. Introduction

The genus *Opisthotropis* Günther (1872) is comprised of 17 currently recognized species, and is widely distributed in eastern, southern, and southeastern Asia (Uetz, 2010). Members of this genus are all small aquatic snakes, mainly inhabiting rapidly flowing streams or small rivers. Ten species of *Opisthotropis* occur in China (Zhao, 2006).

Zhao (1999) described *Opisthotropis cheni* based on four specimens collected from Mt. Mang, Yizhang, Hunan Province, China. Later, Zhao (2005) redescribed these specimens. This species was only known in the type locality previously. Recently, this snake was discovered in Guangdong Province, an area adjacent to the type locality (Guo *et al.*, 2008).

Opisthotropis cheni is a rare species and is endemic to China. Based on several recently collected specimens, this species is newly described in detail below.

2. Materials and Methods

Seven specimens (3 males and 4 females; YBU series

070140, 071041, 071046-071050) (Table 1), collected from the Nanling National Nature Reserve in Ruyuan County, Guangdong Province, China (Figure 1), were morphologically examined in this work. The specimens were preserved in 8% formalin for initial fixation, and later transferred to 75% ethanol. All specimens were deposited at Yibin University (YBU), Sichuan Province, China.

Snout-vent length (SVL) and tail length (TL) were measured using a meter ruler to the nearest millimeter, and the remaining measurements were taken using digital calipers to the nearest 0.1 millimeter as follows: head length (HL, from the tip of snout to the end of lower mandible), head width (HW, the maximum width of head), distance between nostrils (DN), distance between eyes (DE). Paired measurements were measured on the more convenient side (normally on the right), unless one was absent or damaged. Symmetric scale characters were checked on both sides, and given as an average or in left/right order. Ventral scales were counted following Dowling (1951). Three specimens were dissected and described for their hemipenes according to the methods and terminology of Dowling and Savage (1960).

The other abbreviations used in the text and table are: Ds: dorsal scales, Vs: ventral scales, Sc: subcaudal scales, SpL: supralabials, IfL: infralabials, SC10/8: subcaudal scale position of the reduction from 10 to 8 scale rows, DV10/8: dorsoventral position of reduction from 10 to 8 scale rows, SC8/6: subcaudal scale position of the reduction from 8 to 6 scale rows, DV8/6: dorsoventral position

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Table 1 Measurements and scale counts of *Opisthotropis cheni* specimens from this study

Specimens (YBU series)	Sex	SVL (mm)	TL (mm)	DS	Vs	Sc	SpL	IfL	Temporals	SC10/8	DV10/8	SC8/6	DV8/6	SC6/4	DV6/4
071040	♀	390	106	17-17-17	148	59	4-2-3	10	1+1	8.5	3	17.5	2	37.5	2
071042	♂	365	100	17-17-17	152	62	3-2-2	8	1/1+1	-	-	15.5	3	35.5	2
071046	♂	400	104	17-17-17	155	61	4-2-3	9	1+1	14.5	3	23	2	43	2
071047	♀	390	90	17-17-17	148	47	4-1-4/3	10	1+1	4	2	11	3	29	2
071048	♂	395	105	17-17-17	160	64	4-2/1-3	10/8	1+1/1+2	10.5	3.5	22.5	3.5	40	2.5
071049	♀	340	90.25	17-17-17	146	60	4-2-3	10/9	1+1	5.5	3	14.5	3	39.5	2
071050	♀	430	110	17-17-17	153	56	4-1-3	9	1+1	5	2	13	2	37.5	2

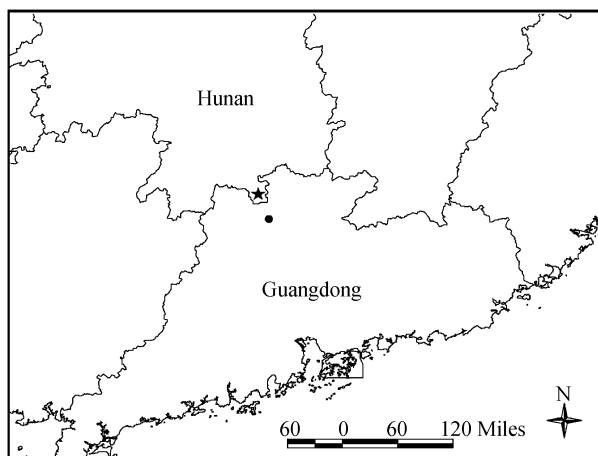


Figure 1 The known distribution of *Opisthotropis cheni*. Solid star: Mt. Mang, Yizhang, Hunan; Solid circle: the Nanling National Nature Reserve, Ruyuan County, Guangdong.

of reduction from 8 to 6 scale rows. SC6/4: subcaudal scale position of the reduction from 6 to 4 scale rows, DV6/4: dorsoventral position of reduction from 6 to 4 scale rows.

3. Results

No distinct neck region is visible, shovel-like snout flattened dorsoventrally, eyes small, pupil round, nostril directed dorsally; prefrontal single; internasals 2, nasals separated, wider than long, triangular, very narrow anteriorly, contacted with rostral, but not with loreals; rostral visible from above, more than two times wider than long; frontal as broad as long, peach-like in shape; parietals longer than wide; one loreal, longer than high, in contact with orbit and nasal; no preocular; two postoculars, the upper much larger than the lower; supraocular single and rectangular; temporals 1+2 or 1+1 or 1, with the anterior much longer than high; supralabials mostly 9, sometimes 8 and rarely 7, with the anterior three ones in contact with nasal medially, the 3rd, 4th, and 5th, or 3rd and 4th touching loreal, and 5th or 5th and 6th touching orbit; infralabials 10, 9 or 8, with the 4th and 5th anterior scales touching the

anterior chin shields; posterior chin shields shorter than the anterior pair, and separated by a small scale; 3–5 small scales between posterior chin shields and the first ventral scale; anal plate divided; body scales arranged in 17 rows throughout; scales on dorsal body and tail feebly keeled except those of the outer rows on each side where no keels are visible; rear-head and temporal region smooth. Of the three males, ventral scales vary between 152–160, the most posterior divided on specimen YBU 071048; subcaudals arranged in 61–64 pairs, the 5th and 9th fused in YBU 071048, and the 2nd fused in YBU 071042. SVL 365–400 mm, TL 100–105 mm, HL 15.64–16.32 mm, HW 6.41–8.55 mm, DE 5.59–5.62 mm, and DN 3.03–3.55 mm. Of the four females, ventral scales vary between 146–153, the most posterior scale divided in specimen YBU 071049; subcaudals 47–62 pairs. SVL 340–430 mm, TL 90–110 mm, HL 14.00–17.39 mm, HW 8.00–9.30 mm, DE 4.99–5.80 mm, and DN 2.59–3.61 mm. See Table 1 for comparative measurements and Figures 2 and 3 for body and head views.

From the seven specimens examined, 5 are a uniform dark olive dorsally with light yellow cross-bands arranging on both sides alternately or meeting dorsomedially, which is consistent with those described by Zhao (1999, 2005). However, two specimens differ in body pattern by having a uniform gray-olive dorsal body coloration and lacking the yellow cross-bands (Figure 2).



Figure 2 *Opisthotropis cheni* from Ruyuan County, Guangdong, showing body patterns lacking (above) and expressing (below) cross-bands.



Figure 3 Dorsal (left), ventral (middle), and lateral (right) views of the head of *Opisthotropis cheni* (YBU 071048).

Maxillary teeth range between 25–28. The hemipenis (YBU071048) extends to the 11th subcaudal, and bifurcates at the 8th subcaudal. The organ is fully covered by dense papillae.

This species is endemic to China and is currently known from the type locality of Mt. Mang, Hunan Province, and from the Nanling National Nature Reserve in Ruyuan County, Guangdong. These two localities are adjacent geographically (Figure 1). All Guangdong specimens were collected at night (ca. 2100 hrs) in a small and swift penstock in the forest at an elevation of approximately 1000 m. When startled, the snakes dove into the stream and hid in rock crevices. They were also found in small river (about 20 m away from the penstock) (Figure 4).



Figure 4 Habitat of *Opisthotropis cheni* (The Nanling National Nature Reserve, Ruyuan County, Guangdong, China)

4. Discussion

The external morphology described herein of the newly collected specimens is generally consistent with those

from the type locality (Zhao, 2005) (Table 1). However, we found two types of body patterns in the Guangdong specimens. One is consistent with that from Hunan Province in having yellow cross-bands. Another one is immaculate, with no yellow cross-bands. We first considered that the two body patterns might represent two different taxa. But further comparison on scalation and body dimension indicated that they were identical. We also checked their MtDNA sequences. These results also supported that they were the same taxon in question (Cyt. b and ND4 data; results will be published elsewhere). Snake color pattern polymorphisms within single species have been well documented, e.g., *Protobothrops jerdoni* (Guo et al., 2009), *Himalayas tibetanus* (Gumprecht et al., 2004). These results lend more support to taking caution when diagnosing snakes based solely on body patterns and colors.

Brown and Leviton (1961) suspected that *Opisthotropis* may not be a natural group. Recently, a preliminary molecular phylogenetic analysis using several Chinese species of *Opisthotropis* agreed with the hypothesis of Brown and Leviton (1961), to some extent. A more thorough study of the entire assemblage of the species is warranted.

A Key to Chinese species of the genus *Opisthotropis*

- | | |
|--|--------------------------|
| 1 Mid-body dorsal scales in 15 rows | 2 |
| -Mid-body dorsal scales in 17 rows | 3 |
| -Mid-body dorsal scales in 19 rows | 7 |
| 2 Dorsal scales in 15 rows throughout, postocular one, temporals 1+1 | <i>O. jacobi</i> |
| -Dorsal scales in 17-15-15 rows, postoculars two, temporals 1+2 | <i>O. guangxiensis</i> |
| 3 Loreal present, not touching eye; two pre- and post-oculars | 4 |
| -Loreal present, touching the eye | 6 |
| 4 Supralabials 10 or 11 | <i>O. lateralis</i> |
| -Supralabials 7 or 8 | 5 |
| 5 Temporals 1+1, supralabials 7, infralabials 8 | <i>O. maxwelli</i> |
| -Temporals 1+2, supralabials 8, infralabials 9 | <i>O. andersonii</i> |
| 6 Many black and yellow stripes present on body | <i>O. latouchii</i> |
| -Gray-olive dorsally, light yellow cross-bands present or absent on body | <i>O. cheni</i> |
| 7 Body scales in 19 rows throughout | <i>O. kuatunensis</i> |
| -Body scales in 19 rows anteriorly and at middle body, 17 posteriorly | 8 |
| 8 Ventral scales 190-205, the median 11 dorsal rows keeled | <i>O. balteata</i> |
| -Ventral scales 149-153, body scales smooth | <i>O. praemaxillaris</i> |

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